Neutrino Factory & Beta Beam Working Group

APS Sponsored Neutrino Study

INTRODUCTION

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General Introduction

Neutrino Factories and Beta Beams both require R&D if they are ever to become a reality.

If we want continued (expanded ?) support for this accelerator R&D we must continue to make the strongest case we can based on the science Neutrino Factories and Beta Beams can do, and show that the R&D is making progress.

In the context of the present APS neutrino study we would like to make an honest assessment of where the R&D efforts for Neutrino Factories and Beta Beams stand and their physics reach …. and then try to write down the best case for supporting the R&D that we can.

Neutrino Factory Introduction

In the last few years in the U.S. there has been a very active (130 people) and effective accelerator R&D Collaboration developing Neutrino Factory designs and technology.

Much progress has been made.

We are not ready to propose a Neutrino Factories yet, but with a level of support consistent with the 2001 HEPAP Subpanel recommendation, and a successful R&D outcome, we expect to be ready within a decade.

Neutrino Factory R&D is becoming increasingly global in character. It is important that the case for the R&D be made within the framework of the Global Particle Physics Program.

Goals for the Neutrino Factory part of the Study

We think that we should be able to achieve the following:

1. Revisit (briefly) the already much studied small θ_{13} physics reach.

2. Identify open physics-reach questions (for large and small θ_{13}) and try to address whichever of these open questions we can.

3. Write down the science case for Neutrino Factory R&D (which up to now has been based on the existence of at least one important scenario in which a Neutrino Factory will be essential to make progress with oscillation physics).

4. Demonstrate and document that Neutrino Factory R&D is making significant progress (towards making Neutrino Factories buildable & cost effective).

Beta Beam Introduction

In the last couple of years there has been a Beta Beam design activity in Europe … but no significant activity in the U.S.

The APS study gives us the opportunity of assessing:

(i) What are the main technology questions that need to be addressed before a Beta Beam facility could be built ?

(ii) How much R&D (and support) is likely to be required to make Beta Beams a real option.

(iii) What is the status of understanding the physics reach of Beta Beams and how does the physics reach stack up against alternatives.

Goals for the Beta Beam part of the Study

Since there is not a large group of people engaged in Beta Beam R&D in the U.S. our Beta Beam goals for the study must necessarily be modest. We think that we should be able to achieve the following:

1. Assess the status of Beta Beam R&D (in Europe), and the main challenges in making Beta Beams a reality.

2. Assess our understanding of the physics reach, and the physics scenarios in which Beta Beams would be essential in the future to make progress with oscillation physics.

3. Document what we find.

TIMETABLE

The timescale for the APS Neutrino Study is very short.

December 2003: Overall Kick-Off Meeting

March 3-4, 2004: NOW – Our Working Group Meeting

April 1-2: Overall Mid-Course Correction Meeting (the various working groups interact)

June/July Reports Finished

Should we plan on a second working group meeting within this timeframe ?

FOCUS FOR THIS MEETING

Given the timetable for the study, our focus for this meeting should be to :

1. Review the status of the R&D
2. Review the physics case(s)
3. Identify open questions
4. Identify which open questions (if any) can be addressed in the next two months